Energy Impacts in North Carolina
The Annual Report of the Energy Policy Council and the State Energy Office

Prepared by the State Energy Office
North Carolina Department of Administration

January 2005

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EXECUTIVE SUMMARY

This annual report of the Energy Policy Council and the State Energy Office (SEO), prepared by the State Energy Office, summarizes state programs, documents economic and environmental impacts of energy production and use, and provides the overall context for examining energy-related issues throughout the state for the period July 1, 2003—June 30, 2004[1]. This report was prepared in accordance with NCGS 113 B-12.

State Energy Office Director Larry Shirley

The past year has witnessed several significant energy milestones for North Carolina, demonstrating everyday that the state leads by example with its energy efforts. The highlights include:

- Increasing energy savings by universities and state agencies through the SEO's Utility Savings Initiative for State Facilities, surpassing $2.6 million in the last year, and assisting 42 state agencies in developing strategic energy plans;
- Providing direct public service to consumers, homeowners, businesses, professionals and the general public: approximately 5,220 public inquiries were addressed; 24 "Energy Connections" television programs were broadcast and 5 issues of N.C. Energy Notes were published and distributed; 262 workshops/trainings, seminars and conferences were supported with approximately 13,000 attendees and approximately 50 media events (radio/television features, press conferences, events, print media coverage) were held;
- Breaking ground on a 17-home sustainable green community of affordable housing in Asheville. This landmark effort in affordable housing is the first neighborhood of the new NC HealthyBuilt Homes Program of the NC Solar Center sponsored and funded by SEO;

[1] *Data in this section are based upon internal SEO records and reports.*

- Passage of amending legislation and official rules for North Carolina's use of "Guaranteed Energy Saving Contracts," or performance contracting, whereby state energy improvements are made and paid for with the energy savings that result from the project;
- Passage of legislation providing tax credits for dispensing and processing renewable fuels for a three-year period;

Overall, the State Energy Office's programs and activities in 2003-04 resulted in over $6.5 million in energy savings.

- Energy savings of over $3.5 million in the industrial sector, achieved through energy audits, surveys and energy consulting services provided through NC State University's Energy Management Program that is sponsored by SEO;
- Selling 19 million kilowatt hours to more than 5,800 subscribers through the NC GreenPower Program;
- Developing landfill methane gas resources, spurring economic development and conserving energy in 5 western counties.

Overall, the State Energy Office's programs and activities in 2003-04 resulted in over $6.5 million in energy savings. About 70,000 gallons of petroleum were displaced with B-20 (a blend of 20% biologically-derived diesel and regular diesel). Emissions reductions were as follows: sulfur dioxide—225 tons, nitrogen oxide—87 tons, and carbon dioxide reductions—38,250 tons.[2]

As the gateway state agency to federal funding for energy programs, the office was also able to significantly leverage the state taxpayer's dollars. Federal grants and matching contributions made by partner organizations and contractors brought over $5 million into the state. Recommendations coming out of a performance audit by the State Auditor's Office are now being implemented and will make the State Energy Office and Energy Policy Council even more effective in the coming years.

North Carolina imports virtually all of its energy requirements, yet technological improvements, sophisticated data management and enabling legislation, leveraged with foresight and opportunity have provided an incubator for the next generation of cleaner energy production within our state borders. Guided by the State Energy Plan, the Energy Policy Council has out-

lined new initiatives and bold actions to limit North Carolina's dependence upon foreign oil, establish and grow energy related businesses, and to identify and use the state's abundant natural resources with a minimum of harmful environmental impacts.

As we enter 2005, we are optimistic about the future of energy use in North Carolina. Many organizations, agencies and businesses are closely collaborating to bring about an energy future that is truly a sustainable one, with less impact on the environment, greater security and enhanced economic activity. In turn, North Carolina's state government has stepped out to lead the effort, working to save energy in its own facilities and to make the transition to a fleet of vehicles that is alternative-fueled and more efficient.

This combination of collaboration and leadership offers a unique and powerful instrument that can propel the state forward in its quest for a sustainable energy future. The Energy Policy Council and the State Energy Office call upon all of the citizens in North Carolina to join us in this most important endeavor.

As we enter 2005, we are optimistic about the future of energy use in North Carolina. Many organizations, agencies and businesses are closely collaborating to bring about an energy future that is truly a sustainable one, with less impact on the environment, greater security and enhanced economic activity.

2 The emission reductions are based on the kilowatt hour savings reported in contract impact reports multiplied by state specific emission factors on EPA's GRID website. GRID is a database that integrates 24 databases from 3 different federal agencies—the EPA, EIA and FERC.

Background

Energy Policy Council

Created by the North Carolina Energy Policy Act of 1975, the Energy Policy Council is charged with overseeing the state's energy policies and providing recommendations for policy changes to the Governor and General Assembly.

The 18-member body is composed of members of the General Assembly, local governments as well as cabinet Secretaries, the North Carolina Public Utilities Commission Chair, and gubernatorial appointments from specific sectors including the petroleum marketing industry, natural gas industry, economic analysis sector, alternative energy sector, industrial energy consumption sector, electric power industry, and environmental protection sector.

The Energy Policy Council adopted a revised State Energy Plan in June 2003, providing guidance for current and future work of the State Energy Office with 92 action items and recommendations. Fifteen of these items were given priority for the first year. In September 2004, the Council reviewed and expanded the action items to 20.

The goals of the Energy Policy Council are implemented through the work, services and activities of the State Energy Office.

Energy Policy Council members and State Energy Office staff members are listed in Appendix D.

State Energy Office

The State Energy Office (SEO) is North Carolina's lead agency for energy programs and serves as the official source for energy information and assistance for consumers, businesses, government agencies, and policy makers. The SEO serves each of North Carolina's 100 counties and administers over 90 programs in four primary areas:

1. **Energy efficiency and renewable energy** for residential, commercial, industrial, agricultural, transportation and utility sectors;

2. **Alternative fuels** and alternative fuel vehicles;

3. **Energy emergencies** during natural disasters and supply disruptions; and

4. **Energy policy** recommendations to the Energy Policy Council, General Assembly, the Governor's Office, and other state agencies.

Mission

The State Energy Office promotes energy efficiency and renewable energy for North Carolina, striving toward a sustainable energy future. The office accomplishes this by administering innovative programs, projects and services that inform, educate, and involve energy consumers, producers and decision-makers. The State Energy Office organizes rapid responses to energy supply emergencies. The office is recognized as North Carolina's primary independent resource for energy information and technology.

History and Funding

The 1973-74 Arab Oil Embargo prompted the creation of the Energy Division in the Department of Military and Veteran Affairs. Its primary responsibility was allocating gasoline, diesel and home heating oil to critical populations through the use of set asides of a percentage of all fuel entering the state. Today, its successor, the State Energy Office, administered by the North Carolina Department of Administration, manages over 90 programs in alternative fuels, energy awareness and education, renewable energy, energy efficiency and projects in the residential, industrial and business sectors.

The State Energy Office currently operates programs with Petroleum Violation Escrow (PVE) funds, the result of court settlements or judgements on the federal level, against oil companies that were found to violate federal price controls. Expenditure guidelines require that funds be spent on energy efficiency and renewable energy programs. North Carolina's funds are held in trust until allocated by the General Assembly. Other SEO funding sources are provided by the U.S. Department of Energy (DOE) under the State Energy Program and Special Projects funding. In many cases, DOE establishes program priorities and guidelines, strongly encouraging the SEO office to establish and support programs in these designated areas. The office currently receives no state appropriated funds, but the PVE sources are nearly depleted. The annual budget for the State Energy Office is approximately $9.8 million using PVE and leveraged funds.

State Energy Plan

As mandated by current state statute, a State Energy Plan must be developed every two years. The current plan, developed with input from energy professionals and the public, was published in 2003 and delineates 92 measures that address the following sectors and issues in the state:

- Energy, Economics, and the Environment
- Fossil and Nuclear Fuels
- Electric Utilities and Energy Use
- Alternative Fuels from Biomass
- Alternative Energy Sources
- Energy Use in the Public Sector
- Energy Use in the Residential Sector
- Energy Use in the Commercial Sector

- Energy Use in the Industrial Sector
- Energy Use in the Transportation Sector
- Energy Education and Research
- Funding for Energy Policies and Programs

Fifteen priorities were selected by the Energy Policy Council for action and focused work by the State Energy Office for fiscal year 2003-04 (Appendix A). In September 2004, the State Energy Office reviewed the entire list of 92 recommendations and suggested revisions and rewording, moving another five recommendations to action item status. The Energy Policy Council recommended 20 key legislative, regulatory, and administrative policies for action in 2004-05 (Appendix B). The entire State Energy Plan and progress reports on the 2004-05 action items can be found on the SEO Website: http://www.energync.net.

North Carolina Energy Trends and Forecasts[3]

Energy Demand

In 2000, North Carolinians spent over $19.3 billion on energy, representing 7% of the Gross State Product. On a per capita basis, each citizen spent $2,394 on energy consumption that year. Approximately 2100 trillion Btus of energy were consumed.

Total energy includes the energy required to generate electricity for each sector—residential, commercial, industrial, and transportation. Figure 1 shows energy use by sector in 2000. In this chart, electricity is accounted for by the energy in the primary fuels used to generate that electricity.

Figure 1:

North Carolina Energy Consumption by Sector 2000

The largest single sector in terms of total energy use (including the energy consumed to generate electricity for the sector) is **industry** at 31% of the total. Petroleum is the fuel used to supply energy to the industrial sector. Petroleum, electricity and natural gas provide about 32%, 20% and 18% of fuel needs respectively, while coal, wood, and waste contribute a significant 30%. The industrial sector is the primary consumer of natural gas, using 49% of North Carolina's total demand. Electric utilities consume most of the coal in the state—coal provided 29% of total energy needs, of which 93% went to generate electricity. North Carolina has 14 utility-owned, coal-fired power stations.

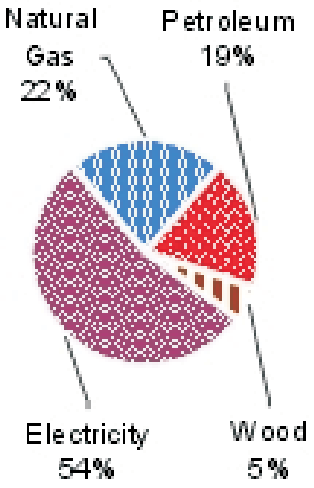
[3] *Data in this section are based upon the North Carolina State Energy Plan, June 2003, unless otherwise noted.*

Users in the **transportation** sector consume the second largest amount of energy with 28% of total energy use. Growth in energy consumption for the transportation sector has been outpacing overall energy consumption in the state. Petroleum provided 38% of energy use in the state, most of which was consumed by the transportation sector. Motor gasoline at 53% and distillate fuels at 22% led petroleum fuels with 75% of the total consumption. Motor gasoline consumption expanded at a 2.3% annual rate between 1990 and 2000, while use of distillate fuel grew at a 3.8 % annual rate.

The **residential** sector accounts for 23% of total energy consumption in North Carolina (Figure 2). The major energy sources for residences are electricity (54% total energy use), natural gas (22%), and petroleum (19%). Wood energy supplies 5% of residential needs. Other sources, which provide less than 1% of the energy demand, include coal and solar energy.

Figure 2:

Residential Energy Source Breakdown



North Carolinians use energy in many ways in their homes, primarily for heating, cooling, and hot water. Space heating and cooling are the largest users of energy in homes—combining to consume over 45% of total household energy. Water heating typically uses 15%, while refrigeration, lighting, and electrical appliances consume almost 37% of total residential energy.

The **commercial** sector is comprised of privately-owned commercial buildings, public buildings, large, multi-family dwellings, facilities for non-profit organizations, and religious buildings. The bulk of energy used by the commercial sector is for heating, cooling, and lighting with lower energy use for domestic hot water, refrigeration, cooking, electronic equipment, and other operations.

Energy Supply

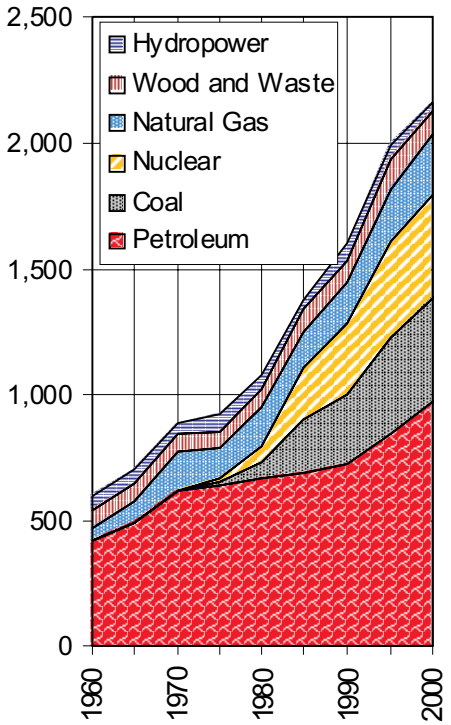
In 2000 **petroleum** supplied 39% of the energy used in the state, **natural gas** supplied 10%, **coal** supplied 29%, **nuclear** supplied 17%, and **renewable energy** sources supplied 5% (Figure 3). Energy consumption has increased more rapidly than population, but less rapidly than our state economy. Between 1977 and 2000, population grew 1.7% annually; energy use increased 2.3% per year, and gross state product expanded at an 8.4% annual rate.

System-wide, **coal** and **nuclear power** remain the dominant sources of fuel for utilities providing electricity to consumers in North Carolina. Electric utilities consume most of the coal in the state—93 % of total coal consumption in 2000. The

state has 14 utility-owned, coal-fired power stations and since coal is not indigenous to the state, the total coal supply must be imported.

Figure 3:

Total Energy Consumption in North Carolina (TBtu)



In 2001, nuclear power generation provided approximately 38% of Progress Energy Carolinas' total generation, 48% of Duke Power's total generation, and 20% of NC Power's generation. **Petroleum** supplies 39% of the state's energy need; motor gasoline (53%) and distillate fuel (22%) led petroleum fuels in 2000 with 75% of the total consumption. Motor gasoline consumption expanded at a 2.3% annual rate between 1990 and 2000, while use of distillate fuel grew at a 3.8% annual rate.

Historically, the electric utility and transportation sectors used very little **natural gas**, although this situation has recently been changing. The U.S. Energy Information Agency's North Carolina Profile shows the number of megawatts of natural gas-fired utility generation increased at an annual growth rate of 22.5% from approximately 1% in 1990 to 7.3% in 1999. **Propane**, a by-product of natural gas processing and petroleum refining, occurs as a gas at atmospheric pressure but is typically liquified for transport and storage. It has a variety of uses: heating homes, heating water, cooking, drying clothes, fueling gas fireplaces, and as an alternative fuel for vehicles. Propane is also used to make petrochemicals, which are the building blocks for plastics, alcohols, fibers, and cosmetics. Residential and industrial sectors dominate propane demand with 90% of total consumption.

While North Carolina does import virtually all of its energy, **renewable energy** resources, primarily wind, solar and biomass, can provide power with less harmful environmental impacts.

North Carolina's biomass resources from the agricultural and waste management sectors are a leading potential source of energy in the state for both electricity generation and direct use as a fuel. According to the U.S. Department of Energy, an estimated 15.8 billion kWh of electricity could be generated each year using renewable biomass fuels in North Carolina in the following biomass categories: mill and forest residues, municipal solid waste and landfill gas reclamation, urban residues and

wastewater treatment plants, animal waste and agricultural residues, and energy crops.

According to the Energy Efficiency and Renewable Energy Network, North Carolina has the capacity to produce 8 million MWh annually—about 7% of current electricity consumption in the state—using wind technology and possesses roughly 8 million MWh of total new hydroelectric generation potential.

Solar currently provides a portion of the energy required for building heating and lighting. Advances in solar technology and building design and construction could enable buildings (including homes) to become less dependent upon conventional sources of electricty. For example, homes can be designed wherby 90% of the heating load is provided by the sun.

One energy source that does not appear in standard energy consumption data is energy efficiency. The Alliance to Save Energy has estimated that energy efficiency reduced projected national energy needs in 1999 by 31%. From this perspective, energy conservation and energy efficiency can be viewed as energy resources.

2003-04 State Energy Office Highlights

The State Energy Office manages over 90 programs in the areas of alternative fuels, awareness and education, buildings, industry, residential and the Utility Savings Initiative. Below are significant accomplishments during fiscal year 2004 (July 1, 2003—June 30, 2004). A complete listing of current programs and impacted North Carolina counties can be found in Appendix C.

Honors Awarded

May, 2004. U.S. Department of Energy, Energy Smart America 2004 National Recognition Award for Leadership. This award recognized the State Energy Office for its "80 comprehensive, creative projects established in North Carolina to promote sustainable energy despite severe fiscal and staff constraints."

May, 2004. National Clean Cities Program. The Triangle Clean Cities Coalition, a major program funded by the State Energy Office, was recognized in the top ten of national coalitions and recognized first within the Southeast region.

October, 2003. Save Our State, Sustainability Awards, (Honorable Mention). Save Our State recognized the SEO's Utility Savings Initiative program which has helped 25 state agencies and 17 universities reduce utility expenditures and conserve energy and water.

Larry Shirley, (left) director of the State Energy Office and Carlton Myrick, Deputy Secretary of the N.C. Department of Administration, receive the 2003 Outstanding Program Award from the National Association of State Chief Administrators president Pam Warren. The award recognized leadership and innovation in the Utility Savings Initiative, whose goal is to reduce energy and water use in state buildings.

Fall, 2003. Council of State Governments, Innovation Awards in South, (Third Place). The State Energy Office was recognized for its Utility Savings Initiative.

August, 2003. National Association of State Chief Administrators, Outstanding Program Award. The State Energy Office was recognized for its Utility Savings Initiative.

Policy and Legislation

In 2004, the State Energy Office supported passage of House Bill 1636 which provides tax credits for dispensing and processing renewable fuels between January 1, 2005 and December 20, 2007. During this session, House Bill 1414 allotted additional PVE funds to the office.

During the 2003 legislative session, the State Energy Office supported two bills which were not passed. House Bill 806, a proposed rebate and grant program for alternative fuel vehicles (AFV), fuels, and infrastructure via DMV registration fees, was withdrawn from a special subcommittee of House Appropriations after approval in House Finance. Senate Bill 846, which would have prohibited subdivision covenants which restrict placement of solar energy systems on residences, passed a Senate vote but died in the House Judiciary IV subcommittee.

Sections were added to existing legislation creating a Low-income Residential Energy Program as a responsibility of the Energy Policy Council, designating the State Energy Office as the lead agency for Performance Contracting, and requiring the office to compile an annual report on guaranteed energy savings contracts. A summary of organizations which provide services related to energy management was required under House Bill 307 and is available as "Report on Request for Information for the Provision of Energy Management Services" on the SEO Website *(http://www.energync.net)*.

Additionally, the State Energy Office participates in a working group, headed by the North Carolina Department of Environment and Natural Resources to study modification of the highway-use tax based on fuel efficiency, and vehicle registration renewal fee based on vehicle miles traveled. At the request of the Environmental Review Commission, a study will evaluate potential sources of revenue to support air quality and transportation efficiency initiatives.

Programs

Alternative Fuels

- The **Alternative Fuel Demonstration Center** opened at the North Carolina Solar Center. The Center's garage has integrated photovoltaic

Biodiesel, a blend of biologically-derived diesel and petroleum-based diesel may offer North Carolina producers and consumers a new market. Generally, B-20 (20% biodiesel blended with regular diesel fuel) burns cleaner than regular diesel and can be produced from traditional agricultural feedstocks such as soy, corn or sweet potatoes. Even waste oil can be converted to usable biodiesel. The State Energy Office has helped support publicly accessible pumps in Garner, Cary, Durham and Salisbury. Any vehicle that uses diesel can use biodiesel.

Photo by Andrea Gabriel

roof panels which use solar energy to charge electric car batteries. It also has a demonstration ethanol distillery.

- The **Centralina Clean Fuels Coalition** was awarded the Clean City designation by the U.S. Department of Energy's National Clean Cities Program making it eligible for grants and federal funding to advance the usage of alternative fuels and AFVs. Nationwide, only 85 other local/regional groups have achieved this designation.
- The **Ethanol from Swine Waste** demonstration project employed hog house designs that do not require water for flushing, greatly reducing water consumption, and evaluated several gasifiers that used hog waste as a feedstock. A survey found that producers want information on waste handling technologies that identifies the costs, verifies the reliability, and explains how the byproducts (e.g., ash) can be marketed.
- **Model Solar Fuel Cell Cars**. The North Carolina team, Smith Middle School from Chapel Hill, placed third in the national competition. The team demonstrated an understanding of air quality issues and served as good ambassadors for the state.

These middle school students compete at the annual EV (electric vehicle) Challenge. While high school students spend the year converting conventional vehicles to ones that operate on electricity, their younger counterparts build model solar powered cars. The State Energy Office also supports the National Energy Education Development program in over 50 North Carolina schools, the goal of which is to promote an energy conscious and educated society by creating effective networks of students, educators, business, government and community leaders to design and deliver objective, multi-sided energy education programs.

Photo by Andrea Gabriel

Awareness and Education

- The inaugural **State Energy Conference** was held in March 2004 with over 400 participants and exhibitors.

The State Energy Office held is inaugural statewide conference in March 2003. The theme of the conference, "Efficient NC: Leading by Example," showcased state and local government successes in energy and water efficiency, fiscal savings and overall environmental sustainability. Over 400 individuals and vendors attended.

Photo by Andrea Gabriel

- A Web-based database, the **North Carolina Waste Trader**, was launched. This online exchange provides an electronic listing and matching of products considered "waste" by one producer but "raw

materials" by another. This service helps companies avoid landfill disposal fees, hauling costs, and sometimes even to realize an income for "waste" products.

- Direct Public Service: Approximately 5,220 public inquiries were addressed; 24 "Energy Connections" television programs were broadcast and 5 issues of N.C. Energy Notes were published and distributed; 262 workshops/trainings, seminars and conferences were supported with approximately 13,000 attendees and approximately 50 media events (radio/television features, press conferences, events, print media coverage) were held.

- Through the N.C. Solar Center, a Web-based **Green Builder database**, that includes over 140 case studies was developed and is disseminated via the Internet *(http://www.ncgreenbuilding.org/site/ncg//index.cfm)*. The database contains information on techniques, strategies, and technologies related to green building.

Buildings

- **Surveys of state buildings** were performed for approximately 30% of the state's 12,500 facilities to identify no-cost, low-cost energy savings measures. 770 buildings were

One of 15 pilot buildings under the "High Performance Building Guidelines," this Operations Center at the North Carolina Arboretum in Asheville exemplifies innovative building design and construction. Plants on the "green roof" absorb rainwater, reduce sound and help cool the building. Solar panels on the roof's backside preheat water used for heating. Geothermal heat pumps use the warmth of the earth for providing heat to the building and dump hot air into the ground during the summer. Inside the building, photo sensors automatically turn lights off and on as rooms are occupied. The State Energy Office works with the State Construction Office to ensure that the "life-cycles" of state buildings is extended.

Photo courtesy of The NC Arboretum - Photo Credit: Sherry Ceallaigh

surveyed totaling approximately 30,000,000 square feet.

- The state government's first **high-performance**, or "green" building—the North Carolina Arboretum's physical plant—was opened in the fall of 2004 and is operational.

Industry

- 3676 **steam trap surveys** were completed with recommendations for repair or replacement at North Carolina industrial sites. Steam properly trapped prevents energy waste.

This boiler is typical of equipment in large, industrial plants, commercial or governmental facilities where much of the energy costs are due to energy waste and equipment malfunction. Under the Utility Savings Initiative, boilers at state facilities and universities are surveyed to identify inefficiencies and waste such as inaccurate temperature gages, inefficient burners, or boilers in need of a tune-up. A new, high efficiency burner installed on this boiler allows the proper mixture of oxygen and natural gas to flow at different operating loads.

Photo by Kathleen Stahl

- Under the **Energy Management Program**, $3.5 million in energy costs were saved through surveys, and audits identifying energy efficiency and energy conservation opportunities.
- 50 energy professionals were awarded the **Energy Management Diploma** by completing a 14-day training program.

Renewable Energy

- The **Small Wind Demonstration Center** at Beech Mountain was implemented with three wind turbines providing power to the electric utility grid. This demonstration site provides the model for future development of wind projects throughout western North Carolina.
- The first statewide **Biomass Resource Conference** was produced and sponsored by the State Energy Office. Biomass is a significant source of energy within our state and is used to generate electricity at several North Carolina locations.
- Detailed **wind maps** and charts showing wind power production potentials for 24 western counties were produced. Less detailed wind maps are available for each North Carolina county.

Residential

- The **NC HealthyBuilt Homes Program** was launched with State Energy Office funding. The first project, a 17-home sustainable green community of affordable housing, is located in Asheville.

- The **Upgrade & Save** program, which replaces furnaces with energy efficient heat pumps in manufactured homes, was expanded from one to eleven North Carolina counties including Pitt, Nash, Wilson, Wayne, Greene, , Martin, Beaufort, Craven, Jones, and Edgecombe.

- The **Energy Efficient Mortgage** program was established, allowing prospective homeowners to finance energy efficient systems through the home mortgage.

These photovoltaic panels at Topsail High School in Pender County, provide the power to charge batteries of electric vehicles that compete in the EV Challenge. Electric cars produce no emissions and if their source of electricity is renewable, there is little environmental impact. The State Energy Office has provided support for several of these charging stations throughout the state.

Photo by Bob Leker

Among the residential programs supported by the State Energy Office is the NC HealthyBuilt Homes Program at the N.C. Solar Center. The first project was this 17-house development in Asheville. HealthyBuilt homes are designed for affordability and resource efficiency. Building materials and processes are selected to reduce pollution and the waste of natural resources both during the manufacturing and construction phases and throughout the life of the home.

Photo by Dona Stankus

Utility Savings Initiative (USI)

- In its first year, USI saved over $1,056,017 in **rate reviews** and changes alone. Over 2300 individuals have been trained on USI program components including performance contracting. Forty-two (42) strategic energy plans have been written and submitted to the State Energy Office. Projected annual savings from USI are estimated at $5.6 million.
- Permanent rules for **Performance Contracting** for state agencies were adopted and the State Energy Office was chosen as the administrator for the program.
- A web-based **ECO Estimating and Report** form *(http://www.rebuild.org/usi/)* was developed to help users determine potential energy savings.

Teaching and professional training are important components in all SEO programs. Here, energy management consultant David Mahoney presents a workshop in strategic energy planning as part of the Utility Savings Initiative. State statute requires that all state agencies write and implement such a plan to guide energy savings and the State Energy Office helps facilitate this process. Other trainings include instruction for performance contracting, the Energy Management Diploma program and various workshops on topics such as green building, renewable energy and technologies and alternative fuels.

Photo by Dave Mahoney

2003-04 Energy Savings, Avoided Costs & Environmental and Economic Impacts[4]

The State Energy Office, in response to a performance audit and as part of the oversight process, began the process of quantifying both economic and environmental impacts of its programs and services. While many projects, such as industrial or building surveys, are easily quantified, others are not. When measures are not available, the office is developing methodologies and metrics to understand and track actual energy savings of a program.

Based upon data collected from its participating contractors, the State Energy Office's programs and activities in 2003-04 resulted in over $6.5 million in energy savings. About 70,000 gallons of petroleum were displaced with B-20 (a blend of 20% biodiesel and regular diesel). Emissions reductions were as follows: sulfur dioxide, 225 tons; nitrogen oxide, 87 tons, and carbon dioxide reductions, 38,250 tons. Over 693,000 kWh were generated using renewable energy. Assessments of industrial and residential sites identified additional potential production of 3,360,000 kWh.

Public awareness and education are critical and significant areas of work for the office, but impacts are difficult to assess. During this same reporting period, the State Energy Office and its contractors provided direct public service to consumers, homeowners, businesses, professionals and the general public:

- Approximately 5,220 public inquiries were addressed;
- Over 30 residential and industry design reviews were completed;
- 24 "Energy Connections" television programs were broadcast via OPENnet, the public cable television program produced through the North Carolina Agency for Public Telecommunications, with a potential viewing audience of 4,283,410 per show;[5]
- 5 issues of N.C. Energy Notes, the online newsletter of the State Energy Office, were published and distributed though various email lists and posted on the website;
- Over 120,000 publications were distributed
- 262 workshops/trainings, seminars and conferences were supported with approximately 13,000 attendees
- Approximately 50 media events (radio/television features, press conferences, events, print media coverage) were held.

[4] *Data in this section are based upon internal SEO records and reports.*

[5] *Number of households that receive OPENnet: 1,720,245 x number of people per household: 2.49. Figures provided by Warner Communications News TV and Cable Factbook, 2004 edition.*

A Look Ahead: Energy, Economy, and the Environment

By Larry Shirley, Director, State Energy Office
N.C. Department of Administration
January 2005

The year of 2004 brought us another year of high, volatile energy prices, presented with a backdrop of a war in Iraq and escalated volatility in the Middle East, near bankruptcy of Russia's largest petroleum company, continuing political unrest in Venezuela, and civil disobedience in the Nigerian oil fields. China, India and a host of Asian nations demonstrated their rapidly increasing appetite for energy as they continued their development, demanding more petroleum for vehicles, building more power plants to supply electricity and, as a result, placing heavy pressure on worldwide energy supplies. Meanwhile, back at home, California's governor warned of potential blackouts in the coming year unless energy conservation efforts were ramped up and more new power plants brought on-line. The prospect of increasing federal funding of energy efficiency and renewable energy efforts dimmed as the federal deficit grew by over $450 billion, exceeding a total of $7.2 trillion.

For North Carolina, these events are a sobering reminder of our vulnerability to supply disruptions and our dependence on energy sources that are often out of our control.

The State Energy Plan, adopted by the Energy Policy Council in August of 2003 and recently revised, provides us with a roadmap. When fully implemented, its 92 recommendations will lead to aggressive development of indigenous renewable energy resources (solar, wind, landfill and animal waste methane, wood and agricultural waste, and small hydro) and lessening of our energy costs through increased efficiency.

For North Carolina, the benefits of such an approach can spur our economy forward with new jobs and businesses in the renewable energy and efficiency sectors, while sending a clear signal throughout the nation that there is a large "Welcome" sign on the state's doors for industry from these sectors to come to this state and do business. By and large, these industries are exactly what the state needs after sustaining enormous manufacturing job losses during the last few years—high paying jobs in industries that will keep energy dollars revolving in the state's econ-

omy. In 2003, the state sent $7 billion out of the state to pay for its fuel. Keeping more of those dollars in the state, and the jobs that are supported by them, can be an increasingly important economic asset. With the energy and industrial expertise that North Carolina possesses, we can broaden our business approach if we make the needed commitment.

A recent study by Appalachian State University concludes that for the fiscal years 2001-03, spending on energy efficiency and renewable energy projects "have had measurable impacts on energy savings, emissions reductions, and the economy."[6] Aggregate impacts in North Carolina over a ten-year period 2001-2010 can be summarized:

- Electricity savings of 862 GWh
- Renewable energy generation of 209 GWh
- Natural gas savings of 1,965 billion BTU
- Combined electric and natural gas bill savings of $61.3 million
- Combined electric and natural gas bill savings of $61.3 million
- Reduced SO2 emissions of 8,260 tons
- Reduced NOx emissions of 1,263 tons
- Reduced CO2 emissions of 1,630,000 tons
- Induced private investment in energy of $22.3 million
- Increased state wages of $26.4 million
- Increased gross state product of $24.3 million
- Net job increase of 1,050

The year of 2004 brought the designation by the Environmental Protection Agency of 34 of our counties as being in "non-attainment status," or out of compliance with federal air quality standards. Even our beloved Great Smoky Mountain National Park, the most visited national park in the U.S., received this designation. The ramifications of these designations can be severe: the loss of federal highway funds, the inability to locate new industry, and other sanctions. Perhaps the most damning aspect of the process, though, is the stigma that is imposed on the local area. Suddenly, the region is viewed as unhealthy—contaminated with poor air quality as evidenced by the frequent notices of "orange," "red," and, though rarely, "purple" alert days for ozone pollution. As the economic engine of the tourist economy in western North Carolina, the warning of park officials for visitors not to hike at elevations above 5,000 feet was sending a powerful message: the air you breathe in our mountains is often unhealthy. And, with visibility just a small fraction of what it was when Lyndon Johnson was President, one can easily see the economic foundation of the region being severely

[6] *Clean Energy Funding for North Carolina: An Impact Analysis of State Energy Office Programs (Draft), September, 2004.*

threatened if air quality conditions are not greatly improved.

To address and remedy all of these issues, we must chart a new course for how we produce and consume energy. This begins with making our homes, schools, churches, offices and factories as energy efficient as we possibly can, using readily available technology to improve our existing buildings while ensuring that the new ones we construct use as little energy as possible.

In parallel we must address the pollution coming from our cars, trucks, and other vehicles, as well as our near total dependence on petroleum, much of it coming from unstable and hostile regimes abroad. We can get there, in part, by raising the efficiency of the vehicles that we drive, and shifting to vehicles that use alternative fuels, such as ethanol, biodiesel, compressed natural gas, propane and electricity. In fact, North Carolina has an excellent opportunity to establish a new model, improving the environment and economy with one stroke. Not only are these fuels kinder to the environment but, in the case of ethanol and biodiesel, we can grow the feedstocks (corn and soybeans) and process them into fuel right here in North Carolina. This could provide a much needed boost for our farmers and the struggling agricultural sector.

Increases in efficiency of our buildings and vehicles, supplemented by alternative fuels, will not solve all of our energy-related problems, however. In essence, these are critical steps that buy us time until we make a transition to the use of much cleaner forms of energy. They help us to lower our pollution levels, reduce the health impacts, and provide a boost to the economy, but they do not address the source of the problem.

The transition to a renewable energy-based economy is the goal that, if reached, can provide us with the ultimate pay-off that we need as a state. Solar, hydro and wind energy are pollution-free, while biomass sources usually have lower emissions than conventional fossil fuels and are abundantly available within the state. In the short term, these fuels can directly power our needs. In the long term, they must be used to make hydrogen, which will supply our needs while emitting only water as a by-product after its use.

Not withstanding the progress that was made in the last year, much work lies ahead. Twenty action items are targeted for focused work during the next fiscal year (Appendix B) in the areas of economic development, environmental protection, technology development, legislation, and building infrastructures for renewable energy, alternative fuels, energy efficiency and educational programs. And over the coming years, all of these efforts must make a transition to a new source of funding. Petroleum Violation Escrow (PVE) funds, which have largely covered the program expenses over the last two decades, will soon run out. Whether it be state appropriations, a Public Benefits Funds or another source, an alternative revenue stream will be needed if North Carolina is going to maintain its momentum and see its energy savings and renewable energy production grow.

Yogi Berra once said that, "when you reach the fork in the road, take it." North Carolina has now reached its energy fork in the road and must decide which turn to take. One path can spur economic growth, protect the health of our citizens, lessen our dependence on out-of-state sources of energy, and reduce the environmental impacts that threaten us. Another path keeps us in a business-as-usual pattern, where we sit out the change and wait for either national mandates or for conditions to deteriorate to the point that we have no choice but to act.

Change is very difficult. It requires patience, tenacity and focused attention. It demands skill, resources and fortitude. And, it cries out for creativity, clear communication and political will.

North Carolinians have the wits and wherewithal to meet these standards for change, embrace it, and establish the state as an energy leader. It just requires that we choose the right fork and back up that choice with the resources needed to make it a reality.

APPENDICES

Appendix A

State Energy Plan

Recommended Action Items 2003-04

The Energy Policy Council reviewed the entire list of 92 policies and programs to determine which measures would require action by the Governor, North Carolina General Assembly, North Carolina Utilities Commission, or other regulating or administrative agency. From the entire list, the Energy Policy Council recommends the following 15 key legislative, regulatory, and administrative policies for action in 2003 and 2004:

Energy, Economic, and Environmental Issues
1. The North Carolina Department of Commerce and the State Energy Office should encourage and support economic development of energy-related enterprises whose products are intended to increase energy efficiency or use renewable resources, such as providers of specialized insulation and window products, heating and air conditioning equipment and controls, distributed generation equipment, solar and wind energy equipment, and fuel cells.
2. The State Energy Office should communicate the energy research being performed in the state to the North Carolina Department of Commerce for its recruiting and economic development strategy.
3. The North Carolina Department of Environment and Natural Resources should create a greenhouse gas registry to track emissions of carbon dioxide and other greenhouse gases, to establish baseline greenhouse gas emissions, and to demonstrate reductions in greenhouse gas emissions for potential greenhouse gas trading systems depending upon the availability of funding.
Alternative Fuels from Biomass
4. North Carolina should support the development of an alternative fuel industry through dedicated funding and grant matching of promising alternative fuel projects. These efforts should include agricultural waste processing facilities, biodiesel and ethanol refineries, fueling stations for alternative-fueled vehicles, production incentives for farmers and refiners, incentives for highly efficient or alternative-fueled vehicles, and education and awareness programs. Developmental efforts should focus on raising feedstock production levels and insuring all 100 counties in the state have alternative fueling infrastructure by 2007. In particular, the Energy Policy Council supports a state program to pay for alternative fuels development via a $1 to $2 fee applied.
5. Based on the results of ongoing research and development studies, the North Carolina General Assembly should pursue strategies that convert animal waste into environmentally sound energy sources.
Alternative Energy Sources
6. The General Assembly should consider adopting net metering for application to all electric utilities in the state.
7. The General Assembly should evaluate a renewable portfolio standard (RPS) that complements the NC GreenPower program and fosters the development of a renewable electricity market. The RPS would require that all electric utilities increase the percentage of total distributed electricity that comes from renewable sources, such as hydroelectric, wind, solar, waste-derived fuels, and agricultural fuels.

8. The General Assembly should reexamine the Mountain Ridge Protection Act as it pertains to wind energy while still protecting North Carolina's natural beauty.
9. The State Energy Office should assess and propose incentives and regulatory or administrative measures for development of renewable electricity generation facilities, solar water heating, passive and active solar space heating, and daylighting.
10. The General Assembly should require that all electric utilities in North Carolina provide generation disclosure of fuel mix percentages and emissions statistics on sulfur dioxide, nitrogen oxides, carbon dioxide, and mercury annually by bill insert and via website. The disclosure information should clarify to the consumer the environmental impact of residential electricity use.
Energy Use in the Public Sector
11. State agencies and universities, with coordination by the North Carolina Department of Administration, should reduce energy consumption in existing state buildings to save 20% by 2008, 4% per year or more for the next 5 years. The State Energy Office should submit an annual report to the Energy Policy Council, the Governor's Office, the State University System and other major energy users in North Carolina that provides data on energy saved in state buildings and universities by source and cost, energy efficiency activities undertaken in these buildings, the approximate investment in energy efficiency measures, and the overall economic costs and benefits of the program.
12. Working in conjunction with the State Construction Office, the State Energy Office should monitor, analyze, and report on the energy savings attributed to the new requirements on life-cycle cost analyses of the $3.1 billion higher education building program currently underway across the state, as well as future projects. The State Energy Office should be responsible for maintaining records that track the consequences of subjecting new public facilities to the newer life-cycle cost procedure.
13. North Carolina should facilitate efforts of local governments to finance energy efficiency and renewable energy projects; specifically, allow bundling of multi-jurisdictional energy efficiency projects to achieve economies of scale and improve opportunities for financing, restructure the underwriting provisions of the State Energy Office's low-interest energy loan program, and provide training in energy efficiency measures to building managers in local government buildings.
Energy Use in the Residential Sector
14. North Carolina State Government should continue to support a strong low-income weatherization program. The state should review the effectiveness of energy conservation programs conducted through the weatherization program and analyze opportunities for improvements. The State Energy Office should develop programs, in addition to weatherization, to address energy-efficient housing in the low-income sector.
Funding for Energy Programs
15. The General Assembly should review options, such as a Public Benefits Fund or other means, to enable funding of the recommendations in the State Energy Plan.

Appendix B

State Energy Plan

Recommended Action Items 2004-05

Energy, Economic, and Environmental Issues
1. The North Carolina Department of Commerce and the State Energy Office should encourage and support economic development of energy-related enterprises whose products are intended to increase energy efficiency or use renewable resources, such as providers of specialized insulation and window products, heating and air conditioning equipment and controls, distributed generation equipment, solar and wind energy equipment, biofuels, and fuel cells.
2. The State Energy Office should communicate the energy research, development, demonstration, and deployment projects being performed in the state to the North Carolina Department of Commerce for its recruiting and economic development strategy.
3. North Carolina should prepare its economy for the emerging national and international greenhouse gas marketplace so North Carolina companies are prepared to win in a greenhouse gas trading system. Establishing baseline greenhouse gas emissions and setting state objectives are two ways that the state can begin to prepare for this new market
Alternative Fuels from Biomass
4. North Carolina should support the development of an alternative fuel industry through dedicated funding and grant matching of promising alternative fuel projects. These efforts should include agricultural waste processing facilities, biodiesel and ethanol refineries, and fueling stations for alternative-fueled vehicles, production incentives for farmers and refiners, incentives for highly efficient or alternative-fueled vehicles, distribution credits for biofuels distributors, buydown program for incremental costs of purchasing biofuels and education and awareness programs. Developmental efforts should focus on raising feedstock production levels and insuring 35 publicly accessible refueling stations in the state have alternative fueling infrastructure by 2007. In particular, the Energy Policy Council supports a state mechanism to pay for alternative fuels development via special fees, tax credits, and other sources.
5. Based on the results of ongoing research and development studies, the North Carolina General Assembly should pursue strategies that convert animal waste into environmentally sound energy sources.
Alternative Energy Sources
6. The General Assembly should consider adopting net metering for application to all electric utilities in the state.
7. The General Assembly should evaluate a renewable portfolio standard (RPS) that complements the NC GreenPower program and fosters the development of a renewable electricity market. The RPS would require that all electric utilities increase the percentage of total distributed electricity that comes from renewable sources, such as hydroelectric, wind, solar, waste-derived fuels, and agricultural fuels.
8. The General Assembly should reexamine existing legislation and regulations as pertains to barriers and strategies to develop wind

energy while still protecting North Carolina's natural beauty.
9. The State Energy Office should assess and propose incentives and regulatory or administrative measures for development of renewable electricity generation facilities, solar water heating, passive and active solar space heating, and daylighting.
10. The General Assembly should require that all electric utilities in North Carolina provide generation disclosure of fuel mix percentages and emissions statistics on sulfur dioxide, nitrogen oxides, carbon dioxide, and mercury annually by bill insert and via website. The disclosure information should clarify to the consumer the environmental impact of residential electricity use.
Energy Use in the Public Sector
11. State agencies and universities, with coordination by the North Carolina Department of Administration, should reduce energy consumption in existing state buildings to save 20% by 2008, 4% per year or more for the next 5 years. The State Energy Office should submit an annual report to the Energy Policy Council, the Governor's Office, the State University System and other major energy users in North Carolina that provides data on energy saved in state buildings and universities by source and cost, energy efficiency activities undertaken in these buildings, the approximate investment in energy efficiency measures, and the overall economic costs and benefits of the program.
12. Working in conjunction with the State Construction Office and the State Property Office, the State Energy Office should analyze available data, and report on the energy savings attributable to the new requirements on life-cycle cost analyses of the $3.1 billion higher education building program currently underway across the state, as well as future projects. The State Construction Office should recommend that new and existing buildings are individually metered for electricity, natural gas, steam, chilled water, and water, to facilitate studies of building energy use and allow comparison with existing buildings not subject to life-cycle cost analysis. Benchmarks for energy intensity, million Btus per Gross Square Feet, for various asset types should be used, as well as Energy Star ratings for offices, dormitories, and hospitals. The State Energy Office should be responsible for maintaining records that track the consequences of subjecting new public facilities to the newer life-cycle cost procedure to the extent possible with available building utility data.
13. North Carolina should facilitate efforts of local governments to finance energy efficiency and renewable energy projects; specifically, allow bundling of multi-jurisdictional energy efficiency projects to achieve economies of scale and improve opportunities for financing, restructure the underwriting provisions of the State Energy Office's low-interest energy loan program, and provide training in energy efficiency measures to building managers in local government buildings.
Energy Use in the Residential Sector
14. North Carolina State Government should continue to support a strong low-income weatherization program. The state should review the effectiveness of energy conservation programs conducted through the weatherization program and analyze opportunities for improvements. The State Energy Office should develop programs, in addition to weatherization, to address energy-efficient housing in the low-income sector. The State Energy Office should investigate technologies, incentives, financing options, and regulatory issues regarding minimum efficiency requirements for manufactured housing and promote Energy Star manufactured homes.
Funding for Energy Programs

15. The General Assembly should review options, such as a Public Benefits Fund (PBF)or other means, to enable funding of the recommendations in the State Energy Plan.
Recommendations Moved Up to Action Items (September 16, 2004)
16. The State Energy Office should increase funding for efficiency programs to enable appropriate agencies in the state to expand technical assistance and analysis efforts to reduce energy use by the industrial sector and, when funds are available, to the commercial sector in North Carolina. Funding should also be provided for follow-up efforts to facilitate implementation of cost effective technologies, including making contacts with vendors to procure bids, assisting with performance contractors, developing sample specifications, and providing other technical assistance. The State Energy Office should investigate and analyze alternative incentives to increase the implementation of efficiency and renewable energy measures, including low interest loans, performance contracts, and incentive payments. The outreach and technical assistance program should support ongoing efforts to reduce water usage in industrial and municipal operations and, if funds are available, to commercial operations.
17. State agencies should convert at least 10% of their entire fleet to high efficiency (over 40 miles per gallon) or alternative-fueled vehicles by 2005 and 20% by 2010. The North Carolina Department of Transportation should provide supporting fueling infrastructure.
18. The State Energy Office should support development of a comprehensive information outreach program for consumer questions about saving energy and using renewables in their homes and businesses; information hotline via a toll-free telephone number; informative Web Page containing a wide array of publications available on-line; resources that include up-to-date information on renewables and energy efficient buildings, industrial facilities, and vehicles, as well as data on energy sources in the state; information on energy-producing facilities; environmental information related to energy consumption; and other energy-related information.
19. North Carolina should require that K-12 students learn about energy. Energy issues should be incorporated into the end-of-grade tests. The SEO should provide educational materials, training, and activities for current classroom teachers and K-12 students.
20. The State Energy Office should organize a statewide effort to develop criteria for a residential high performance building program to reduce the life cycle cost of new and existing buildings. The criteria should utilize provisions from other successful high performance programs, including Energy Star, programs developed by Advanced Energy Corporation, NC Healthy Built Home, Southface Energy Institute's Earthcraft Home, U.S. Department of Energy's Building America, and others.

Appendix C

State Energy Office Programs Active During Fiscal Year 2003-04

Contract Number	Contract Name	Contractor	Begin Date	End Date	Impacted Counties
04-EDU-AG1	Website Completion	Ricky Ebersohl	4-Apr-04	8/12/2004	AA-Statewide
04-EDU-AG2	Consumer Energy Education	NCSU Cooperative Extension/Family & Consumer	1-Oct-04	30-Jun-05	AA-Statewide
00-8002-AF01	Ethanol From Swine Waste	NC State University	01-Jul-00	31-Mar-04	Wake
00-DENR-SOCHG	Solar Charging Center	NC State University	19-Feb-01	05-Jun-03	Wake
01-4662-MSRI	Million Solar Roofs Initiative	NC State University	09-Nov-01	31-Aug-03	Mecklenburg, Buncombe, Watauga, Durham, Orange, Guilford, New Hanover, Cumberland
02-SPP-BL2	Feasibility of Wind Energy In NC Mountains	Appalachian State University	10-May-02	31-Mar-04	Cherokee, Clay, Graham, Swain, Macon, Jackson, Haywood, Transylvania, Henderson, Buncombe, Madison, Yancey, McDowell, Polk, Burke, Rutherford, Caldwell, Avery, Watauga, Wilkes, Ashe, Allegheny, Surry, Mitchell
02-SPP-BL3	NC Wind Working Group	Appalachian State University	06-Sep-02	14-Jul-03	Haywood, Watauga, Buncombe, Ashe, Avery, Macon, Yancey, Jackson, Madison, Swain, Alleghany, Henderson, Mitchell, Graham, McDowell, Transylvania, Cherokee, Burke, Clay, Wilkes, Polk, Rutherford, Caldwell, Surry
02-SPP-BL4	Western NC Anemometer Loan Program	Appalachian State University	19-Nov-02	30-Jun-04	Haywood, Watauga, Buncombe, Ashe, Avery, Macon, Yancey, Jackson, Madison, Swain, Alleghany, Henderson, Mitchell, Graham, McDowell, Transylvania, Cherokee, Burke, Clay, Wilkes, Polk, Rutherford, Caldwell, Surry
02-SPP-BL5	Cape Lookout PV Hybrid Power System	NC State University	14-Nov-02	30-Sep-03	Carteret
02-SPP-BL6	Wind Data & Micro-Site Analysis	NC State University	05-Feb-03	30-Apr-04	Watauga
02-SPP-RJ3	Wilkes County Landfill Gas Utilization Project	Blue Ridge Resource C & D Council	29-May-02	30-Sep-03	Wilkes
02-UTL-BL3	North Carolina Solar Program	NC State University	01-Jul-02	30-Jun-03	AA-Statewide
02-UTL-BL4	Assessment of Agricultural Crop Residues & Wood	NC A&T University	19-Nov-02	30-Apr-04	AA-Statewide

Contract Number	Contract Name	Contractor	Begin Date	End Date	Impacted Counties
02-UTL-BL5	Geothermal Heating and Cooling	NC State University	11/12/2002	9/30/2004	Wake
03-SPP-BL1	Advancement of Million Solar Roofs in NC	NC State University	11-Jul-03	30-Nov-04	New Hanover, Mecklenburg, Orange, Durham, Guilford, Buncombe, Watauga, Harnett
03-SPP-BL2	NC Coastal Wind Assessment	NC State University	06-Jan-04	31-Dec-04	Brunswick, New Hanover, Pender, Onslow, Jones, Carteret, Craven, Pamlico, Beaufort, Hyde, Washington, Tyrrell, Dare, Chowan, Perquimans, Pasquotank, Camden, Currituck
03-UTL-BL1	NC Solar Center	NC State University	02-Jul-03	31-Jul-04	Wake
04-SPP-BL1	NC Coastal Wind Working Group	NC State University	24-May-04	30-Sep-05	Brunswick, New Hanover, Pender, Onslow, Jones, Carteret, Craven, Pamlico, Beaufort, Hyde, Washington, Tyrrell, Dare, Chowan, Perquimans, Pasquotank, Camden, Currituck
04-SPP-BL4	Cherokee Wind Metering	Eastern Band of Cherokee Indians	19-Nov-02	31-Dec-04	Swain
04-UTL-BL1	Assessment of Agriculture Residues and Crop Waste	NC State University	02-Aug-04	31-Dec-04	AA-Statewide
04-UTL-BL3	Wind Data & Microsite Analysis	NC State University		31-May-05	Watauga
13-52664-A	Clean Tech - Western NC Small Wind Initiative	Appalachian State University	04-May-04	04-May-06	Haywood, Watauga ,Buncombe, Ashe, Avery, Macon, Yancey, Jackson, Madison, Swain, Alleghany, Henderson, Mitchell, Graham, McDowell, Transylvania, Cherokee, Burke, Clay, Wilkes, Polk, Rutherford, Caldwell, Surry
02-SPP-CM3	Triangle J Clean Cities	Triangle J Council of Governments	02-Sep-02	30-Jun-05	Chatham, Durham, Orange, Wake, Johnston, Lee, Moore
02-SPP-CM4	Southeastern Alternative Fuels Workshop	Land of Sky Regional Council	31-Dec-02	02-Nov-04	Multi-State (NC, GA, TN, SC)
03-BLD-CM1	Low Income Residential Program - Public Housing Authority	Advanced Energy		30-Jun-04	Wake, Lee, Durham, Granville
03-EDU-CM1	National Energy Educational Dev Program (NEED)	NEED	30-May-03	31-Dec-04	Mecklenbug, Harnett, Johnston
03-TRN-CM2	Alt Fuels RFP - Triangle Clean Cities	Triangle J Council of Governments	01-Oct-03	30-Sep-06	Wake, Chatham, Orange, Franklin, Johnston, Durham
03-TRN-CM4	Alt Fuels RFP - Centralina Clean Cities	Centralina Council of Governments	01-Oct-03	30-Sep-06	Anson, Cabarrus, Gaston, Iredell, Lincoln, Mecklenburg, Rowan, Stanly and Union
03-TRN-CM5	Alt Fuels RFP - Asheville Clean Cities	Land of Sky Council of Governments	01-Oct-03	30-Sep-06	Henderson, Buncombe, Madison, Transylvania

Contract Number	Contract Name	Contractor	Begin Date	End Date	Impacted Counties
03-TRN-CM6	Alt Fuels & Vehicle Incentive Program for NC RFP-13-3270	NC Solar Center	06-Apr-04	30-Jun-05	AA-Statewide
04-SPP-CM1	High Performance Building Design Workshop	NC Solar Center		30-Sep-04	Buncombe
13-38950-D	Sustainable Community Development RFP	Innovative Design	10-Mar-04	09-Mar-06	Wake
13-38950-E	Sustainable Community Development RFP-Town of Chapel Hill	Town of Chapel Hill	10-Mar-04	09-Mar-06	Orange
13-52664-B	Clean Tech - Mobile Biodiesel Production & Education	Central Carolina Community College	04-May-04	04-May-06	Lee
13-52664-C	Clean Tech - NEED Schools Going Solar	NEED	04-May-04	04-May-06	Mecklenburg, Harnett, Johnston
13-52664-D	Clean Tech - E-85 Infrastructure Project	Wake Technical Community College	04-May-04	04-May-06	Wake
03-BLD-KS1	Energy Management Diploma	NC State University	08-Dec-03	30-Jun-05	AA-Statewide
03-BLD-KS3	Strategic Energy Planning Workshops	David Mahoney	13-Apr-04	31-Dec-05	AA-Statewide
03-BSL-KS2	Advancing Energy Efficient Buildings in Western NC	Land of Sky Regional Council of Governments	23-Mar-04	30-Jul-05	Counties West of I-77
04-BLD-MOP5	USI Surveys-WRP-MOP	Land of Sky Regional Council		30-Jun-05	AA-Statewide
02-BLD-MOP3	Survey Partner	UNC-Charlotte	10/14/2002	6/30/2004	Mecklenburg
02-BLD-MOP4	Survey Partner	Appalachian State University	10/14/2002	6/30/2004	Watauga
03-SPP-TM2	Landfill Gas Fueled Microturbine Analysis	Appalachian State University	5/30/2003	6/30/2004	Avery
03-TRN-CM3	Hybrid Electric Bus	Advanced Energy	10/1/2003	9/30/2006	AA-Statewide
STF-002001	Database Consulting Services (ITS Contract)	Paragon - Dan Coleman	4/30/2004	6/30/2004	AA-Statewide
03-SPP-TM4	Blue Ridge Landfill Methane Initiative - Avery County	Blue Ridge Resource C & D Council	01-Sep-03	30-Nov-04	Avery
04-SPP-BL2	Wilkes County Landfill Gas Utilization Project	Blue Ridge Resource C & D Council	29-May-02	30-Sep-04	Wilkes
04-UA-PB1	Utility Bill Payment and Accounting Service (RFP #13-43326)	Cadence Network	12/1/2003	12/1/2004	AA-Statewide
13-38950-A	Sustainable Community Development - Jackson County Landfill Gas	Altamont Environmental	10-Mar-04	09-Mar-06	Jackson
13-38950-B	Sustainable RPF-Blue Ridge RC&D-Watauga Co. Energy Prk.	Blue Ridge RC&D	10-Mar-04	09-Mar-06	Watauga

Contract Number	Contract Name	Contractor	Begin Date	End Date	Impacted Counties
03-BLD-CM2	Low Income Residential Program - Manafactured Homes	Greenville Utilities Commission (03-BLD-TM1-A)	13-Jun-03	30-Jun-04	Pitt
03-BLD-RD2	Low Income Residential Program - Manufactured Homes	ECU College of Technology & Computer Science		30-Jun-04	Pitt, Nash, Wilson, Greene, Lenoir, Martin, Beaufort, Craven, Jones, Edgecombe, Wayne
03-SPP-CM1	Renewable Energy Implent & Trng at Fed & NC Parks	NC Solar Center	26-May-04	31-Dec-04	Dare
03-SPP-SB1	Stirling Engine	NC A&T University	07-Mar-03	30-Nov-03	Guilford
04-BLD-RD1	Green Bldg Demonstration & Pilot Project: Affordable Housing Sector	Mountain Housing Opportunities	01-May-04	31-Dec-05	Buncombe
04-BLD-RD3	Low Income Residential Program - Clean Tech Demo Initiative	Metropolitan Housing and Community Development Corp.		6/30/2005	Beaufort
13-38950-C	Sustainable Communities RFP -	Carrboro Collaborative Dev. Assoc.	10-Mar-04	09-Mar-06	Orange
01-4661-LGB01	Local Government Buildings Waste Reduction Partners	Land of Sky Regional Council of Governments	24-Sep-01	31-Dec-03	Buncombe, Henderson, Cherokee, Avery, Haywood, Transylvania, Polk, Yancey, Cadwell, Gaston, Mitchell, Lincoln, Cleveland, Mecklenburg, Macon, Burke
02-EDU-SS1	Awareness & Marketing-Energy Policy Update	Appalachian State University	22-Jan-02	31-Dec-04	AA-Statewide
02-IND-SS2	North Carolina Waste Exchange	Department of Environment and Natural Resources	01-Mar-02	30-Jun-05	Wake, Alamance, Ashe, Beaufort, Bladen, Buncombe, Cabarrus, Caldwell, Carteret, Catawba, Chatham, Cleveland, Craven, Cumberland, Davidson, Davie, Durham, Forsyth, Gaston, Granville, Guilford, Haywood, Henderson, Iredell, Lee, Lincoln, McDowell, Mecklenburg, Moore, New Hanover, Onslow, Orange, Pitt, Polk, Randolph, Robeson, Rockingham, Rutherford, Transylvania, Union, Vance, Watauga, Wayne, Wilson, Yadkin
02-UTL-SS2	Energy Emergency Preparedness	National Association of State Energy Offices	01-Oct-02	31-Dec-03	AA-Statewide
03-TRN-CM7	Model Solar Fuel Cell Program	NC Solar Center	06-Apr-04	30-Jun-05	Iredell, Brunswick, Buncombe, Gaston, Rowan, Orange, New Hanover, Transylvania, Wake, Cumberland, Mecklenburg, Pender, Hoke
01-4661-HBG01	Local Government Units High Performance Building Guidelines	Triangle J Council of Governments	08-Jun-01	30-Jun-04	AA-Statewide
02-BLD-SB1	Housing Energy Efficiency	Residential Energy Services Network	11/27/2002	6/30/2004	Wake, Mecklenburg, New Hanover, Forsyth, Buncombe

Contract Number	Contract Name	Contractor	Begin Date	End Date	Impacted Counties
02-BLD-SB3	Public Schools Energy Improvement Lee County Schools	NC State University	19-Aug-02	30-Sep-04	Lee
02-EDU-SB2	Awareness & Marketing-Energy Management Diploma	NC State University	3/8/2002	6/30/2003	AA-Statewide
02-IND-RJ2	Boiler Efficiency Technical Assistance	NC State University	7/1/2002	10/31/2003	AA-Statewide
02-IND-RJ4	Energy Management Program	NC State University	01-Jul-02	30-Jun-03	AA-Statewide
02-SPP-SB4	NC Energy Code Assessment	South Face Energy Institute	10/11/2002	6/30/2004	AA-Statewide
03-BLD-TM1-B	CERT	NC A&T University	7/18/2003	12/31/2004	AA-Statewide
03-IND-TM1	NC Combined Heat & Power (CHP)	NC State University	13-Jun-03	31-May-04	Union
03-IND-TM2	Energy Management Program - NCSU Industrial Extension Service	NC State University	10/27/2003	9/30/2004	AA-Statewide
03-IND-TM5	Boiler Work and Technical Assistance Surveys	NC State University	11/1/2003	9/30/2004	AA-Statewide
04-SPP-SB1	NC Green Builder Training Certificate Program	NC State University		30-Jun-05	AA-Statewide
04-SPP-SB2	Update Energy Codes	South Face Energy Institute	7/30/2004	12/31/2004	AA-Statewide
04-SPP-SB3	ARO Industrial Program Sup/Motor Test Future Energy Challenge	Advanced Energy	Jun-04	6/30/2004	Wake
RFP #13-09004	Steam Trap Survey	Carolina Steam Specialty	11-Feb-03	11-Feb-05	AA-Statewide
RFP #13-09004	Steam Trap Survey	Energy Check Systems Inc	11-Feb-03	11-Feb-05	AA-Statewide
RFP #13-09004	Steam Trap Survey	Environmental Services International	11-Feb-03	11-Feb-05	AA-Statewide
RFP #13-09004	Steam Trap Survey	Hickory Industrial Sales Inc	11-Feb-03	11-Feb-05	AA-Statewide
RFP #13-09004	Steam Trap Survey	Spirax Sarco Inc.	11-Feb-03	11-Feb-05	AA-Statewide
02-BLD-MOP1	Survey Partner	NC A&T University	10/14/2002	6/30/2004	Guilford
02-BLD-MOP2	Survey Partner	NC State University	10/14/2002	6/30/2004	Carteret, Pender, Craven, Currituck, Camden, Chowan, Perquimans, Pasquotank, Washington, Dare, Tyrrell.
02-IND-RJ1	NC Industries of The Future Marketing	NC State University	01-Jun-02	30-Apr-04	Guilford, Buncombe, Mecklenburg

Contract Number	Contract Name	Contractor	Begin Date	End Date	Impacted Counties
02-IND-TM1	NC Industries of the Future Profiling & Outreach	NC State University	30-Oct-02	07-Jan-04	Wake
02-SPP-RJ2	NC Industries of the Future Implementation Program	NC State University	01-Jun-02	30-Apr-04	Wake, Buncombe
03-BLD-VT1	Performance Contracting	Donahue and Associates	11/4/2003	3/12/2004	Wake
03-IND-TM3	Use of AGR & Forestry Waste as a Distributed	NC State University	28-Jul-03	31-May-04	Haywood, Jackson, Washington, Craven, Richmond
03-IND-TM4	Industry Profiling for State Agriculture	NC State University	10-Jun-03	30-Jun-05	Johnston, Wayne, Sampson
03-SPP-TM3	Industries of the Future Program for the Agriculture Industry	NC State University	10-Jun-03	30-Jun-05	Guilford, Mecklenburg
03-SPP-TM5	State IOF Program Review Workshop	NC State University	01-Jul-04	21-Jul-04	Wake
03-SPP-VT1	Rebuild America - NAESCO	National Association of Energy Service Companies	26-May-04	30-Jun-05	Guilford, Wayne, Pitt
04-IND-VT4	NC IOF Marketing	NC State University		6/30/2005	Beaufort, Gaston, Guilford, Orange, Mitchell
04-SPP-VT3	NC Glass IOF Profiling and State Exposition	NC State University	04-Nov-04	30-Sep-05	

Appendix D
Energy Policy Council Members
State Energy Office Staff

Current Energy Policy Council Members are:

Cabinet Secretary Members

Commissioner Britt Cobb; Ex-officio, *N.C. Department of Agriculture & Consumer Services*;
Ron Fish, Designee

Secretary Jim Fain; Ex-officio*,*
N.C. Department of Commerce;
Bob McMahan, Designee

Secretary William G. Ross, Jr; Ex-officio,
N.C. Department of Environmental & Natural Resources;
Gary Hunt, Designee or
Steve Wall, Designee

Secretary Gwynn T. Swinson; Chair, Ex-officio,
N.C. Department of Administration;
Deputy Secretary Carlton Myrick or
Michael Hughes, Designee

North Carolina Utilities Commission Member

Chairman Jo Anne Sanford; Ex-officio*, N.C. Utilities Commission*;
Commissioner Mike Wilkins or
Sam Watson, Designee

General Assembly Members

Senator Hamilton C. Horton, Jr., *General Assembly*, Forsyth County

Senator Eleanor Kinnaird, *General Assembly*, Chatham, Lee, Moore, Orange, Randolph Counties

Representative Louis M. Pate, Jr. *General Assembly*, Wayne County

Representative Joe P. Tolson, *General Assembly*, Edgecombe, Nash, Pitt, Wilson Counties

Public Sector Members

Robert Burns, *petroleum marketing industry*, Arey Oil Company

William McAulay, *natural gas industry*, PSNC Energy

Rodney Locks, *elected municipal official, City of Brevard*

Dr. John L. Neufeld, *economic analysis sector*, University of North Carolina at Greensboro

Mike Nicklas, *alternative energy sector*, Innovative Design

Ray Ogden, *industrial energy consumption sector*, Moore County Economic Development

Dave Plyler, *elected county commissioner*, Forsyth County

Wade Pridgen, *electric power industry*, Progress Energy

Michael Shore, *environmental protection sector*, Environmental Defense

State Energy Office Staff

Director	*Larry E. Shirley*
Section Chief, State Energy Program	*Starlette Brown*
Program Managers	
Policy	*Sharon Stroud*
Renewable Energy	*Bob Leker*
Alternative Fuels	*Cynthia Moseley*
Awareness/Education	*Andrea Gabriel*
Buildings	*Star Brown*
Residential	*Russell Duncan*
Industry	*Starlette Brown*
Utility Savings Initiative	
Rates	*Phil Bisesi*
Performance Contracting	*Vince Throop*
Operations & Management	
Education & Outreach	*Kathleen Stahl*
Public Information Coordinator	*Andrea Gabriel*
Contracts Administrator	*Rondra McMillan*
Administrative Assistant	*Marianne Moss*
Office Assistant	*Sterling Bowen*
Office Assistant	*Phyllis Johnson*

Contact Information
State Energy Office
N.C. Department of Administration

1830 A Tillery Place
Raleigh, NC 27604

Mailing Address: 1340 Mail Service Center
Raleigh, NC 27699-1340
919-733-2230—telephone
1-800-662-7131 (NC only)
919-733-2953—fax
http://www.energync.net
email: **energyinfo@ncmail.net**

Appendix E

State Energy Office
Program Highlights

Alternative Fuels

The State Energy Office supports a number of alternative transportation programs designed to reduce dependence upon fossil fuels and improve air quality. Alternative fuels encompass several different technologies ranging from electric and hybrid vehicles, to those using compressed natural gas, biodiesel, ethanol and propane as fuel.

The Mobile Biodiesel Production and Education Facility is a hands-on demonstration vehicle that can go to most commercial locations which discard vegetable oil as waste, and convert it onsite to biodiesel to be used as fuel. The biodiesel processing technology includes a storage vessel for waste vegetable oil, another for methanol or other alcohol, and another for lye or potassium hydroxide. On board are mixing technologies to combine the catalyst with methanol to form methoxide and a simple reactor to combine the methoxide with the used vegetable oil. The energy required for the mixing of these reactions is provided by an onboard biodiesel powered generator. The **Alternative Fuel and Vehicle Incentive Program for North Carolina** promotes the use of alternative fuel vehicles (AFVs) in North Carolina through outreach and education, training and technical support, policy analysis and research and demonstration. The ultimate goal is to equalize the price of alternative fuels with that of traditional fuels. The **Carolina Electric Vehicle Coalition** is a nonprofit education program that teaches high school students how to convert a conventional gasoline powered vehicle to one that uses batteries.

Working with various councils of governments, the State Energy Office actively supports the U.S. Department of Energy's **Clean Cities Program.** Clean Cities' mission is to advance the nation's economic, environmental, and energy security by supporting local decisions and practices that contribute to the reduction of petroleum consumption. **Asheville Clean Cities** is working to establish Clean Cities designation for the Asheville area with assistance from the Land of Sky Regional Council. **The Centralina Clean Fuels Coalition** received designation in 2004. **Triangle J Clean Cities Coalition**, the first designation in the state, provided incentive grants to local governments and large private fleets to use biodiesel in buses, trucks and other vehicles, with area-wide participation and success.

The **Ethanol Infrastructure Project** at Wake Technical Community College will establish an E-85 (85% ethanol blend) fuel facility on the main campus in Raleigh. Through a grant from the N.C. Department of Transportation, fuel prices will be slightly subsidized by the Triangle Clean Cities Coaliton to compete with 89 octane grade gasoline. This project will include an aggressive awareness and education campaign targeted at Wake Tech, N.C. State University, Meredith College, St. Augustine University and Shaw University, and all Wake county schools, for use in their fleets. The

long-term goal of this project is to establish an I-85 corridor of fueling stations that stretch from the coast to the mountains. The **Hybrid Electric Bus** project will initially model conventional and hybrid bus types to determine their respective energy and environmental impacts and in the second phase, in conjunction with other partners, build a prototype hybrid bus and evaluate its performance. The **Model Solar Fuel Cell Cars** is a project that provides middle school students with a hands-on opportunity to learn about transportation challenges while building a model fuel cell car with solar panel to compete in a statewide competition.

Awareness and Education

The State Energy Office collects, organizes and disseminates energy information to the public through various channels including television and radio programs, a Website, an online newsletter, an annual State Energy Conference and other conferences, workshops and trainings, publications, and through a toll free telephone number, 1-800-662-7131.

Energy Connections is a monthly cable television broadcast statewide and allows direct access to the State Energy Office staff, contractors and partners. Each month, a panel of energy experts presents information about one of the State Energy Office's programs in the areas of alternative fuel vehicles, renewable energy, energy management and efficiency in the residential, transportation, industrial and commercial sectors, and energy emergencies. The ***North Carolina Energy Outlook*** documents North Carolina's current use of fuel and electricity in residential, commercial, industry, agriculture and transportation sectors and projects the state's energy needs through 2020. ***N.C. Energy Notes*** is the online newsletter of the State Energy Office and reports national, regional and state energy news, highlights the office's programs and provides a calendar of energy related activities. Two other important documents produced by the office are the ***State Energy Plan*** and the ***State Energy Emergency Plan***. Each of these reports and the newsletter are available online, as are dozens of **factsheets** and **technical reports**. Each fall and winter, from October through March, the State Energy Office, along with other participating state energy offices, surveys propane and heating oil dealers servicing North Carolina consumers for the **State Heating Oil and Propane Program**. Propane and Number 2 heating oil prices are reported weekly to the Energy Information Administration and are availble on the **SEO Website**.

The **National Energy Education Development Program (NEED)** promotes an energy conscious and educated society by creating effective networks of students, educators, business, government and community leaders to design and deliver objective, multi-sided energy education programs. More than 700 educators participate in NEED programs in North Carolina. All NEED materials are correlated to the North Carolina Department of Public Instruction's science curriculum standards. The **State Energy Conference** annually brings together the energy community and related specialists to showcase North Carolina's successes in efficient operations in the areas of energy and environmental sustainability. Throughout the year, the State Energy Office sponsors and cosponsors **educational events, workshops, conferences** and **trainings** inlcuding the Southern Environment and Energy Expo, the Renewable Energy Update, the SEO Biomass

Conference, Sustainable North Carolina awards, AFV Odyssey Day and the Southeast Green Power Summit. The SEO also supports a number of green builder and Utility Savings Initative-related workshops throughout the year.

Buildings

Energy savings can be achieved through design, operations and maintenance of buildings and facilities in all sectors including governments and schools, commercial and industrial.

The **Energy Codes Assessment** program provides residential and commercial training to design professionals, code officials and builders on the specifics of the International Energy Conservation Code. Low interest loans are available to North Carolina businesses and industry, schools and community colleges, nonprofit organizations and local governments when energy efficiency improvements are made to their facilities through the **Energy Improvement Loan Program**. Under the **High Performance Buidling Guidelines**, 15 state, university and community college buildings are being designed and constructed using features that are energy efficient, incorporate reusable and renewable resources, provide natural lighting, non-toxic, require low maintenance, incorporate water conservation measures, and cause minimum adverse impact to the environment. The **North Carolina Green Builder Training Certificate Program** supports the startup costs for an ongoing certificate program for builders, subcontractors and designers and ensures that energy, water, and materials are used efficiently during the construction and lifetime of the structure; the health and productivity of occupants is supported; and the impact of the structure on the local and global environment is minimized. The major objective of the NC Green Builder Program is transformation of the housing market to more resource friendly construction. **Waste Reduction Partners** is a volunteer group of retired engineers sponsored by Land-of-Sky Regional Council that perform energy audits for nonprofit organizations, local governments, state agenciesgovernment, commercial and industrial buildings west of I-77.

Industry

Industry is the largest user of energy in the state and the State Energy Office coordinates several programs to help ensure that North Carolina businesses and industries are productive, energy efficient, technologically savvy, and competitive. These programs assist North Carolina companies with energy and cost savings through education and training, surveys and technical assistance and loan programs.

Through a series of **Boiler Efficiency Workshops**, plant personnel learn how to solve boiler efficiency problems and promote state-of-the-art equipment to maintain optimum boiler efficiency. Workshops are supplemented with technical on-site surveys which determine the level of efficiency, identify causes of boiler inefficiency and develop a plan for corrective action. The **Center for Energy Research and Technology (CERT),** housed at North Carolina A&T State University and supported in part by the SEO, provides education, training, demonstration, and technical assistance on energy and

environmental technologies. Programs fall under three main areas: Technology Transfer, Demonstration, and the **Manufactured Housing Research Initiative.** The **Energy Management Program**, operated in conjunction with the Industrial Extension Service, North Carolina State University, provides workshops and industrial energy surveys that identify opportunities and demonstrate techniques for optimizing energy use in various building systems, promoting energy conservation in industrial, institutional, commercial, and governmental buildings. In partnership with North Carolina State University, the State Energy Office has targeted five North Carolina industries—mining, agriculture, glass, wood products, and chemical—to help increase profitability through energy efficiency, in the **Industries of the Future** (IOF) program. **Steam Trap Surveys** provide services to a variety of North Carolina industrial facilities, commercial businesses, local government and institutional facilities using steam for heating and/or processing. Steam traps are identified, tested and tagged if not working properly. These services enable facilities to cut steam loss, saving energy and money.

Renewable Energy

The Energy Office supports several programs that utilize biomass, solar, and wind energy sources.

Biomass

The biomass to energy area represents an unusually wide array of opportunities. Landfill gas sites can be mined for methane. North Carolina has over 130 municipal, county and private landfills. Methane gases from these landfills can be recovered to power industries and businesses. The State Energy Office works with the Environmental Protection Agency's **Landfill Methane Outreach Program** (LMOP), a voluntary assistance and partnership program that promotes the use of landfill gas as a renewable, green energy. Several projects already operate in the state. The Yancey-Mitchell landfill was first successful landfill gas project developed in 1999 under the auspices of the Blue Ridge Resource Conservation and Development Council, Inc. and several other partners. **EnergyXchange**, as the project is called, provides electricity for a pottery kiln, glass blowing studio and greenhouse near Spruce Pine. New projects are underway in Jackson, Watauga and Wilkes counties.

Crop wastes and food processing by-products can be used to generate feedstocks for fuels. Dedicated energy crops can be grown to be converted into energy after harvest. Forestry and municipal wood wastes can be used as fuels. An **Assessment of Agricultural and Wood Residues** is being conducted by North Carolina A&T University. Surveys have been administered to farmers and wood harvesting operations. In addition, livestock wastes present a large opportunity for energy generation in North Carolina. The **Ethanol from Swine Waste Project**, conducted at North Carolina State University, demonstrated an alternative hog house that does not require water for flushing, greatly reducing water consumption and evaluated several gasifiers that used hog waste as a feedstock. A survey found that producers want information on waste handling technologies that identifies the costs, verifies the reliability, and explains how the byproducts (e.g., ash) can be marketed. The project has focused on both the technical

issues and economic implications of various swine waste gasification options. A final report is available on the SEO Website.

NC GreenPower

Through the **NC GreenPower** program**,** North Carolina is the first state in the nation to bring together all of its utility companies to provide renewable, or "green," power to consumers, businesses and governments in the state. As of July 1, 2004, over 5000 consumers had signed to participate in the program.

Solar

Photovoltaic systems convert sunlight directly into electricity. Passive solar and daylighting incorporate design features such as large south-facing windows and building materials that absorb and slowly release the sun's heat. Passive solar designs can also include natural ventilation for cooling. The State Energy Office supplies major funding for the **North Carolina Solar Center**, a research demonstration and educational center operated by the College of Engineering at North Carolina State University. The Solar Center provides technical support and outreach in solar, wind, alternative fuels, biomass, and green building technologies. The Center's Solar House and Alternative Fuel Vehicle demonstration facility showcase renewable technologies and are open to the public. Demonstrated technologies include solar electricity, wind power, solar domestic hot water, passive solar design, and solar electric vehicle charging. These technologies are monitored for performance and are accessible by the general public. The Solar Center facilitates the **NC Daylighting Consortium**, a group of design professionals that is enabling the use of natural lighting in buildings and the **Million Solar Roofs Initiative** partnership. Seven community partnerships have been formed across the state: Asheville and surrounding counties, the town of Chapel Hill, the city and county of Durham, Guilford County, Watauga County, Wilmington, and Mecklenberg County. These partnerships identify and address barriers which prevent the deployment of solar technologies. The **Cape Lookout PV Hybrid Power System** is located at Morris Marina Fish Camp on Portsmouth Island of the Cape Lookout National Seashore. The camp has six duplex rental cabins and a caretaker's cabin, all powered by the photovoltaic (PV) hybrid power system which has a 4 kW solar photovoltaic array and a 6.5 kW propane generator for generating electricity for the whole camp. A final report on this project is available online.

Wind

The State Energy Office supports several wind projects, primarily in the mountain and coastal areas. **North Carolina Wind Maps** were developed for the entire state, including mountain, sound and offshore areas. Data on wind frequencies for various heights above ground level are available for points across the state to a resolution of 200 meters by 200 meters. Graphical wind directional information is also available from this map. Wind **attitude surveys** have been completed for North Carolina's mountain and coastal areas by Appalachian State University. There are **Coastal Wind** and **Mountain Wind Working Groups** to address local outreach and education issues and the **Western NC Small Wind Initiative** is testing and demonstrating small-scale wind technology

currently available in the marketplace. The **NC Anemometer Loan Program** provides equipment to interested land owners for measuring the viability of producing electricity with residential scale wind technology on their property.

Residential

Design reviews are available for individuals and businesses through the North Carolina Solar Center to evaluate and suggest cost effective improvements to increase the energy efficiency and show how solar technologies can be incorporated into new buildings in the design stage. The State Energy Office has joined with Residential Services Network (RESNET) and Fannie Mae to promote the E**nergy Efficient Mortgages Program.** Through this program, prospective homeowners can finance energy efficient systems through the home mortgage. Several key lenders, including Wachovia and Countrywide, have actively joined the program. The **NC HealthyBuilt Homes** Program is a green builder program for small to medium size homebuilders that may not have the resources to compete in the rapidly emerging field of green building. Builders can currently receive technical assistance, design reviews, workshops, and consultation from the North Carolina Solar Center to increase their knowledge of green building principles. The new program is expected to provide marketing assistance and third party monitoring through field review services. The State Energy Office contracted with Advanced Energy Corporation to incorporate energy efficiency standards into **Public Housing Authorities** in Gastonia, Sanford and Beaufort, North Carolina. Low- to moderate-income families are the least able to afford homes that meet these minimum standards for housing. Advanced Energy guarantees their energy improvements and the resulting lower energy costs. In partnership with East Carolina University, the State Energy Office expanded the **Upgrade & Save** program to make manufactured housing more energy efficient at the time of sale of the home. Incentive grants are being provided to replace highly inefficient electric furnaces with more efficient heating systems. Previously confined to Pitt county, the program now serves homes in Nash, Wilson, Wayne, Greene, Lenoir, Martin, Beaufort, Craven, Jones, and Edgecombe counties.

Utility Savings Initiative

The Utility Savings Initiative (USI) is a comprehensive, multi-programmed approach to reduce utility expenditures and resource use in state buildings.

In 1994, State government spent $257 million in utilities including electricity, natural gas, propane, fuel oil, water and sewer and coal for steam production. Electricity is the dominant source of energy, providing 65% of the total; natural gas and propane provide 14%, coal 13%, and fuel oil 7%.

The goals of USI are to ensure that: 1) all agencies and universities are billed on the most economical utility rate schedule; 2) no- and low-cost operation and maintenance conservation measures are implemented; 3) an agency strategic energy plan is developed; 4) agency personnel receive appropriate training and resources; 5) investment in energy projects will be encouraged, funded by repair and renovation and other funds as

available; 6) performance contracts, or guaranteed energy savings contracts, will be promoted to fund comprehensive energy projects.

To achieve these goals, USI pursues multiple strategies, utilizing both representatives from agencies, universities and private contractors. The overall goal of USI is to reduce utility use and expenditures 4% over the next 5 year, resulting in a 20% reduction.

The **Rate Review and Accounting Savings** project examines all state government agency utility bills to ensure the most appropriate rate, with over $1,000,000 savings in its first year. Because electric consumption patterns change over time, and new accounts are added, the State will review electric rate schedules on an annual basis. The next review is scheduled for the second quarter of the 2005 fiscal year. Through the **Operations and Maintenance** program, surveys of state buildings are performed to determine no- and low-cost energy savings opportunities. **Performance contracting** allows universities and agencies to make energy improvements in their facilities, paying for them out of the utility savings yielded from those improvements. The State Energy Office assists these agencies with training, information and technical assitance. The office also assists in other **training and education efforts**, educating state employees, training engineers and energy and buildings professionals in resource efficiency, establishing support groups within state agencies and universities and coordinating the development of agency strategic energy plan, mandated by state statute. State universities are the largest consumer of energy and water, using about 60% of the state's total.